WT 98-143

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From: "Gregory D. Lapin" <lapin@EC.Rockwell.COM>
To: K3DOM.K3PO1(MDEPONT)
Date: Wed, Mar 17, 1999 5:20 PM
Subject: Request for additional comments to docket 98-143

Dear Mr. DePont:

I am writing to ask if there is any possibility of adding comments to NPRM 98-143.

These comments were to be submitted with the ARRL comments but were inadvertently left out.

The comments are related to the technical correctness of some of the text in Part 97, particularly with respect to the Environmental Assessment text. I have attached a Word 97 format document in case you wish to look at these comments prior to their submission.

I apologize for the two month delay in the submission of this text. I have decided to try to present it despite the delay because it would help to clarify the text in some of Part 97, making these rules easier to follow.

Thank you for your attention to this matter.

Sincerely,

Gregory D. Lapin, PhD, PE

Gregory D. Lapin, Ph.D., P.E., would like to respond to the FCC Notice of Proposed Rule Making 98-143. There are two parts of this NPRM that deal with RF Safety issues.

Paragraph 3 deals with changes to the power limits that, when exceeded, lead to the requirement of performing a routine RF environmental evaluation of an amateur radio station.

I find two inconsistencies between the table in 97.13c and other definitions in Part 97.

1) The power limits for all stations, except repeaters, are to be measured as "*PEP input to antenna.*" The definition of PEP in 97.3b(6) describes "... *power supplied to the antenna transmission line* ..." Combining 97.3b(6) and 97.13c, the footnote to the table would be interpreted as "*power supplied to the antenna transmission line input to the antenna.*" I find this to be confusing and suggest changing the definition of PEP to be simply a description of the measurement of power and then to specify the location of measurement in each place that the term, PEP, is used. I recommend the following changes to Part 97:
   a) Part 97.3b(6) should be changed to read: "*(6) PEP (peak envelope power). The average power during one RF cycle at the crest of the modulation envelope, taken under normal operating conditions.*"
   b) There are seven other places in Part 97 where the term, PEP, is used [97.313(b), 97.313(c), 97.313(d), 97.313(e), 97.313(f), 97.313(g), and 97.313(h)]. Each of these is of the form: "*No station may transmit with a transmitter power exceeding [xx] W PEP...*" All seven of these should be changed to read: "*No station may transmit with a transmitter power at the input to the transmission line exceeding [xx] W PEP...*"
2) The power limit for repeater stations in this table states that it should be measured as ERP. Nowhere else in Part 97 is ERP mentioned or defined. This is inconsistent with the use of other technical terms in this Part, most of which are defined in 97.3b. Elsewhere in 47CFR, Ch. 1, the term, ERP, is used in 16 parts (1, 2, 5, 21, 22, 23, 25, 27, 73, 74, 78, 80, 87, 90, 95, and 101). However, there are definitions for the term in only 5 places (21.2, 22.99, 27.4, 90.7, and 101.3). Also, in 2.1091 there is reference to a definition of ERP in 2.1, which is not there.
   a) The definitions of ERP are somewhat confusing because they use three different sets of wording to ostensibly mean the same thing (although this is not entirely clear for the case of 90.7):
      [21.2] Effective radiated power (ERP). The product of the power supplied to the antenna and its gain relative to a half-wave dipole in a given direction.
      [22.99] Effective radiated power (ERP). The effective radiated power of a transmitter (with antenna, transmission line, duplexers etc.) is the power that would be necessary at the input terminals of a reference half-wave dipole antenna in order to produce the same maximum field intensity. ERP is usually calculated by multiplying the measured transmitter output power by the specified antenna system gain, relative to a half-wave dipole, in the direction of interest.
      [27.4] Effective Radiated Power (ERP) (in a given direction). The product of the power supplied to the antenna and its gain relative to a half-wave dipole in a given direction.
      [90.7] Effective radiated power (ERP). The power supplied to an antenna multiplied by the relative gain of the antenna in a given direction.
      [101.3] Effective Radiated Power (ERP). The product of the power supplied to the antenna and its gain relative to a half-wave dipole in a given direction.
   b) All definitions of ERP in the various parts of the FCC Rules and Regulations refer to "power." In the Amateur Radio Service, power is generally defined as PEP which should, as I have suggested above, indicate a method of measurement. I suggest that the definition of ERP for the Amateur Radio service be customized to match the rest of Part 97 and be placed in this part as 97.3b(2), with the previous definitions, 97.3b(2) through 97.3b(10), renumbered to be 97.3b(3) through 97.3b(11). The new 97.3b(2) should read:
      [97.3b(2)] Effective Radiated Power (ERP). The product of the PEP supplied to the antenna and its gain relative to a half-wave dipole in the direction of maximum signal.

2) Additionally the paragraphs that precede this table discuss its use and bear reexamination. In particular, in the proposed text of 97.13c:
   Before causing or allowing an amateur station to transmit from any place where the operation of the station could cause human exposure to RF electromagnetic field levels in excess of those allowed under 1.1310 of

this chapter, the licensee is required to take certain actions.

a) In the paragraph that follows, 97.13c(1), the requirements for performing a "routine RF environmental evaluation" are given.

b) In the next paragraph, 97.13c(2), the requirements are given for limiting RF environmental exposure following the routine RF environmental evaluation that indicates this to be necessary.

c) Only in the first paragraph of 97.13c is it alluded to that regardless of the requirement to perform a routine RF environmental evaluation, an Amateur Radio station must not exceed the RF environmental exposure limits as described in 1.1310. It is not clear that this is the responsibility of every Amateur Radio operator and not just those that exceed the limits in the table. It is important that this wording be made clear since, as it currently stands, the wording could be confused to mean that this requirement applies only to those stations running increased power. For example, it is possible that a station running 49 Watts on the 10 meter band with an dipole antenna strung along the ceiling of the room (a situation that is not uncommon for Amateur Radio operators who live in apartments) is exceeding the RF environmental exposure limits for both the Amateur's family living in the apartment and for the family upstairs, yet this Amateur would not be required to perform a routine RF environmental evaluation. The wording: "certain actions" is also confusing because these actions, and what they accomplish, are not specified. I suggest modifying the text of 97.13c to read:

> Before causing or allowing an amateur station to transmit from any place where the operation of the station could cause human exposure to RF electromagnetic field levels in excess of those allowed under 1.1310 of this chapter, the licensee is required to take actions to reduce human exposure to acceptable levels. This requirement exists independently of the requirement to perform a routine RF environmental evaluation, as stated below.

d) Also, the discussion of limiting RF environmental exposure should not be limited solely to those stations that perform a routine RF environmental evaluation. There is also some inconsistency in the wording that might suggest that it is the field strength of the RF electromagnetic fields that I am concerned about and not the human exposure to the same. I suggest modifying the text of 97.13c(2) to read:

> If the human exposure to RF electromagnetic fields from an Amateur Radio station could exceed the limits contained in 1.1310 of this chapter, the licensee must take action to appropriately reduce human exposure to such RF electromagnetic fields. Further information on evaluating compliance with these limits can be found in the FCC's OET Bulletin Number 65, "Evaluating Compliance with FCC Guidelines for Human Exposure to Radio Frequency Electromagnetic Fields."

Paragraph 10 of the NPRM discusses changes to the content of the various written test element for the Amateur Radio service. While I realize that the intent of this change is to combine the questions from the current Elements 2 and 3A into a single exam, also called element 3A, I note the following:

1) RF Safety questions are included only in Elements 3A and 3B. Even though this is the distribution of questions that has been used since the inception of RF Safety questions, now would be a good time to add RF Safety to elements 4A and 4B to emphasize this topic's importance to all Radio Amateurs.

2) While I are not currently prepared to offer a solution, I note for the record that with the current number of questions on each examination element and the requirement for a passing grade of 70-75%, it is possible to pass all of the written examination elements without answering a single RF Safety question correctly. I feel that knowledge of RF Safety is an indispensable part of being an amateur radio operator and would like consideration to be given to insuring that every holder of an Amateur Radio license be aware of RF Safety.